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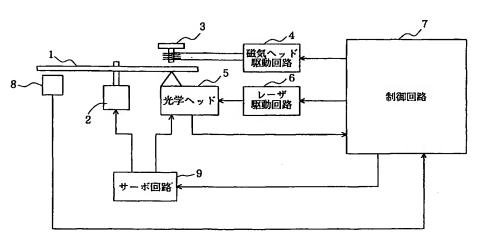
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(54) Title: DISC REPRODUCTION DEVICE

(54) 発明の名称: ディスク再生装置



- 5...OPTICAL HEAD
- 4...MAGNETIC HEAD DRIVE CIRCUIT
- 6...LASER DRIVE CIRCUIT
- 7...CONTROL CIRCUIT
- 9...SERVO CIRCUIT

(57) Abstract: A disc reproduction device includes a laser drive circuit (6) capable of supplying a drive signal to an optical head (5) and adjusting a laser beam power emitted from the optical head (5) and a control circuit (7) for detecting an error rate of the (5) and adjusting a laser beam power emitted from the optical head (5) and a control circuit (7) for detecting an error rate of the reproduction signal and controlling operation of the laser drive circuit (6). The control circuit (7) repeatedly searches one of the two boundary values of the error rate, i.e., when the error rate is a predetermined value or in the vicinity of the predetermined value and calculates an optimal reproduction power by using the searched boundary value as a reference. Here, the control circuit (7) searches a new boundary value by using the boundary value obtained by the previous optimal reproduction power calculation as a reference.

(57)要約: 本発明に係るディスク再生装置は、光学ヘッド(5)に駆動信号を供給して光学ヘッド(5)が出射する レーザ光のパワーを調整することが可能なレーザ駆動回路(6)と、再生倡号のエラーレートを検出すると共にレー ザ駆動回路(6)の動作を制御する制御





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回路(7)とを具えている。制御回路(7)は、エラーレートが規定値或いはその近傍値となる2つの境界値の内、一方の境界値を検索し、検索された一方の境界値を基準として最適再生パワーを算出する処理を繰り返す。このとき、制御回路(7)は、前回の最適再生パワー算出処理で得られた境界値を基準として、新たな境界値を検索する。

明細書

ディスク再生装置

5 技術分野

本発明は、ディスクに光学ヘッドからレーザ光を照射して、該ディスクから信号を再生するディスク再生装置に関するものである。

背景技術

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10 従来、ディスク記録再生装置の記録媒体として、書換え可能であって、記憶容量が大きく、然も信頼性の高い光磁気ディスクが開発されており、コンピュータやオーディオ・ビジュアル機器の外部メモリとして広く用いられている。

特に近年においては、図8に示す如く光磁気ディスク(1)の信号面に、ランド(11)とグルーブ(12)を交互に形成し、ランド(11)とグルーブ(12)の両方に信号を記録して、記録密度を上げる技術が開発されている。ランド(11)及びグルーブ(12)は、図示の如く蛇行(ウォブリング)しており、蛇行の周波数は、所定の中心周波数にFM変調がかけられており、信号再生によって、このウォブル信号が検出され、ウォブル信号が常に中心周波数となる様に光磁気ディスクの回転を調整することによって、線速度一定制御が実現される。又、ウォブル信号には、前述の如くFM変調がかけられて、アドレス情報等の各種の情報(ウォブル情報)が含まれており、信号再生時には、このウォブル情報に基づいて各種の制御動作が実現される。

尚、レーザパルス磁界変調型のディスク記録再生装置においては、信号の再生時に、光磁気ディスクにレーザ光が照射されると共に、信号記録時にも、光磁気ディスクにレーザ光が照射されて、光磁気ディスクが局所的に加熱される。又、磁気超解像を利用した光磁気ディスクにおいては、信号再生時のレーザパワーを

上げていって、ビームスポット領域の温度が所定値に達したときから信号の読出 しを開始するのであるが、信号再生時のレーザパワー(再生パワー)は、信号記録 時のレーザパワー(記録パワー)よりも低く設定されるので、信号再生に伴って記 録信号が破損してしまう虞はない。

5 ところで、ディスク記録再生装置の信号再生においては、例えば図9に示す如く再生パワーが変化することによって、再生信号のエラーレートが二次曲線的に変化し、エラーレートが最小値となる最適再生パワーPrcentが存在する。再生パワーが最適値Prcentからずれると、再生信号のエラーレートが増大し、エラーレートが一定の規定値を超えると、正常な信号再生が困難となる。同様に、信号記録においても、エラーレートが最小値となる最適記録パワーが存在し、エラーレートが一定の規定値を超えると、正常な信号記録が困難となる。従って、信号再生時のレーザパワーを、エラーレートが規定値或いはその近傍値となる2つの境界値、即ち下方境界再生パワーPrminと上方境界再生パワーPrmaxの間に設定すると共に、信号記録時のレーザパワーを、エラーレートが規定値或いはその近傍値となる2つの境界値、即ち下方境界再生パワーPrminと上方境界再生パワーの間に設定すると共に、信号記録時のレーザパワーを、エラーレートが規定値或いはその近傍

そこで従来のディスク記録再生装置においては、システムの起動時に、エラーレートが最小となる最適な再生パワー及び記録パワーを検索することとしている。 最適再生パワーの検索処理においては、図12に示す如く、先ず再生パワーを 初期値Poに設定し、再生パワーを下げることによって、再生パワーをエラーレー

初期値 P_0 に設定し、再生パワーを下げることによって、再生パワーをエラーレートが所定の規定値(=20)以下となる下方境界値 $Prmin_1$ まで変化させ、その後、その再生パワーに所定値N(所定ステップ分のパワー)を加算することによって最適再生パワー P_1 を求める。

図10は、ディスク記録再生装置の起動時に実行される再生パワー調整手続き 25 を表わしている。先ずステップS51にて、現在の再生パワーPrとして初期値P 。を設定し、ステップS52にて、テストトラックの再生を行なって、そのときの

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エラーレートEを測定する。次にステップS53では、測定したエラーレートE が規定値E $_0$ (=20)を上回っているか否かを判断し、ノーと判断された場合は、ステップS54に移行して再生パワーPrを4ステップ分だけ下げた後、ステップS52に戻って、同じ手続きを繰り返す。

5 その後、エラーレートEが規定値E。を上回ってステップS53にてイエスと判断されると、ステップS55に移行して、再生パワーPrを1ステップ分だけ上げた後、ステップS56にて、テストトラックの再生を行なって、そのときのエラーレートE'を測定する。次にステップS57では、測定したエラーレートE'が前記規定値E。以下であるか否かを判断し、ノーと判断された場合は、ステップS55に戻って、同じ手続きを繰り返す。

エラーレートE'が規定値E₀以下となってステップS 5 7にてイエスと判断されると、ステップS 5 8に移行して、その時点での再生パワーPrを下方境界値Pr rminとし、更にステップS 5 9では、下方境界再生パワーPr rminに4ステップ分のパワーを加算して得られる値を最適再生パワーPr rcentとして、手続きを終了する。この結果、最適なレーザパワーで信号の再生が開始されることになる。

しかしながら、信号再生及び信号記録のための通常動作時においては、レーザ 光の照射によってディスク温度が徐々に上昇し、これに伴って最適記録パワーや 最適再生パワーが変化することになる。従って、システムの起動時にレーザパワ ーが最適であっても、その後の通常動作においてはレーザパワーが最適値からず れて、正常な信号記録や信号再生が困難となる。

そこで、通常動作において、ディスク温度に所定温度以上の温度変化が生じる 度にレーザパワーの最適化を実行することとしている。

通常動作時の最適再生パワーの検索処理においては、図13に示す如く、先ず再生パワーをその時点での設定値 P_1 から下げることによって、再生パワーをエラーレートが所定の規定値(=20)以下となる下方境界値 P_1 min $_2$ まで変化させ、その後、その再生パワーに所定値 P_1 のであるアップ分のパワー)を加算することによ

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って、最適再生パワーPgを求める。

図11は、システム起動後の通常動作において、所定温度(=5°C)以上の温度変化が発生したときに実行される再生パワー調整手続きを表わしている。先ずステップS61にて、再生パワーPrをその時点での設定値とし、ステップS62にて、テストトラックの再生を行なって、そのときのエラーレートEを測定する。次にステップS63では、測定したエラーレートEが規定値 E_0 (=20)を上回っているか否かを判断し、ノーと判断された場合は、ステップS64に移行して再生パワーPrを4ステップ分だけ下げた後、ステップS62に戻って、同じ手続きを繰り返す。

10 その後、エラーレートEが規定値 E_0 を上回ってステップ S_0 6 3にてイエスと判断されると、ステップ S_0 6 5に移行して再生パワー Pr_0 6 1ステップ分だけ上げた後、ステップ S_0 6 6にて、テストトラックの再生を行なって、そのときのエラーレートE'6 を測定する。次にステップ S_0 6 7では、測定したエラーレートE'6 規定値 E_0 以下であるか否かを判断し、ノーと判断された場合は、ステップ S_0 6 5 に戻って、同じ手続きを繰り返す。

エラーレートE'が規定値E₀以下となってステップS67にてイエスと判断されると、ステップS68に移行して、その時点での再生パワーPrを下方境界値Prminとし、更にステップS69では、下方境界再生パワーPrminに4ステップ分のパワーを加算して得られる値を最適再生パワーPrcentとして、手続きを終了する。この結果、光磁気ディスクの温度に応じた最適なレーザパワーで信号の再生及び記録が継続されることになる。

しかしながら、上記ディスク記録再生装置においては、図13に示す如く、通常動作時の再生パワーの最適化において下方境界値Prminを検索する際に基準とする再生パワー、即ち、その時点で設定されている再生パワー P_1 は、新たな下方境界値 $Prmin_2$ から遠く離れた値であるため、新たな下方境界値 $Prmin_2$ の検索に長い時間が必要となり、最適再生パワーの検索に時間がかかって、本来の再生動

作及び記録動作に支障をきたす虞がある問題があった。

本発明の目的は、通常動作時に短時間で最適なレーザパワーを求めることが出来るディスク再生装置を提供することである。

5 発明の開示

本発明に係るディスク再生装置は、光学ヘッドに駆動信号を供給して光学ヘッドが出射するレーザ光のパワーを調整することが可能なレーザ駆動回路と、レーザ駆動回路の動作を制御する制御回路とを具え、制御回路は、信号再生時のレーザ光のパワーを最適化する処理を繰り返す再生パワー最適化手段を具えている。

10 そして、該再生パワー最適化手段は、

信号再生状態の良否を表わす評価データを検出する評価データ検出手段と、 評価データが規定値或いはその近傍値となる再生パワーの2つの境界値の内、

一方の境界値を検索する検索手段と、

検索された一方の境界値を基準として最適再生パワーを算出する最適再生パワ

15 一算出手段

とから構成され、前記検索手段は、前回の最適化処理で得られた境界値を基準と して新たな境界値を検索する。

尚、評価データとしては、例えば、再生信号に含まれるビットエラーの発生頻 度(ビットエラーレート)を採用することが出来る。

- 20 本発明の再生パワーの最適化においては、前回の最適化処理で検索された境界値を基準として新たな境界値が検索される。ここで、前回の最適化処理で検索された境界値は、その時点で設定されている再生パワーよりも新たな境界値に近い値である。従って、境界値の検索に要する時間が短縮化され、これによって最適再生パワーの算出にかかる時間が短縮される。
- 25 具体的構成において、検索手段は、前記2つの境界値の内、値の小さい方の下 方境界値を検索し、最適再生パワー算出手段は、下方境界値に所定値を加算する

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ことによって最適再生パワーを決定する。

再生パワーとエラーレートの関係は、上述の如く二次曲線で表わすことが出来、二次曲線の頂点に対応するレーザパワーが、エラーレートを最小化する最適再生パワーとなる。又、再生パワーの最適値が変化すると、これに伴って下方境界値も変化し、最適値と下方境界値との差は略一定の値となる。従って、下方境界値が得られれば、下方境界値にこの差を加算することによって最適再生パワーを求めることが出来る。

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又、具体的には、ディスクの温度を検出する温度検出手段を具え、再生パワー 最適化手段は、ディスクの温度が所定温度だけ変化する度に再生パワーの最適化 を実行する。

上記具体的構成においては、ディスクの温度が所定温度だけ変化する度に、ディスクの温度に応じた最適再生パワーが得られ、光学ヘッドから出射されるレーザ光のパワーが最適値に調整される。この結果、信号再生時のビットエラーレートは最小化され、信号再生に伴って記録信号が破損される虞はない。

15 上述の如く、本発明に係るディスク再生装置によれば、通常動作時に短時間で 最適なレーザパワーを求めることが出来る。

図面の簡単な説明

図1は、本発明に係るディスク記録再生装置の構成を表わすブロック図である。 図2は、上記ディスク記録再生装置の起動時に実行される手続きを表わすフロ ーチャートである。

図3は、起動時に実行される再生パワー調整処理の具体的手続きを表わすフローチャートである。

図4は、上記ディスク記録再生装置の通常動作時に実行される手続きを表わす 25 フローチャートである。

図5は、通常動作時に実行される再生パワー調整処理の具体的手続きを表わす

フローチャートである。

図 6 は、上記ディスク記録再生装置の起動時に実行される再生パワー調整処理 の手順を説明するグラフである。

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図7は、上記ディスク記録再生装置の通常動作時に実行される再生パワー調整 5 処理の手順を説明するグラフである。

図8は、光磁気ディスクに形成されているランドとグループを表わす拡大斜視 図である。

図9は、再生パワーとエラーレートの関係を表わすグラフである。

図10は、従来のディスク記録再生装置において起動時に実行される再生パワ 10 一調整処理の具体的手続きを表わすフローチャートである。

図11は、上記ディスク記録再生装置において通常動作時に実行される再生パワー調整処理の具体的手続きを表わすフローチャートである。

図12は、上記ディスク記録再生装置の起動時に実行される再生パワー調整処理の手順を説明するグラフである。

15 図13は、上記ディスク記録再生装置の通常動作時に実行される再生パワー調整処理の手順を説明するグラフである。

発明を実施するための最良の形態

以下、本発明を、光磁気ディスクを記録媒体とするディスク記録再生装置に実 20 施した形態につき、図面に沿って具体的に説明する。

本発明に係るディスク記録再生装置においては、図1に示す如く、スピンドルモータ(2)によって回転駆動される光磁気ディスク(1)を挟んで上下に、磁気へッド(3)と光学ヘッド(5)が配備され、磁気ヘッド(3)には磁気ヘッド駆動回路(4)が接続される一方、光学ヘッド(5)にはレーザ駆動回路(6)が接続されている。

25 磁気ヘッド駆動回路(4)及びレーザ駆動回路(6)には制御回路(7)が接続され、 該制御回路(7)によって信号の記録/再生動作が制御されている。そして、光学

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ヘッド(5)の出力信号が制御回路(7)に供給されて、増幅、再生信号の検出、エラー訂正などの処理が施された後、再生データとして後段回路へ出力される。

又、スピンドルモータ(2)及び光学ヘッド(5)にはサーボ回路(9)が接続されている。光学ヘッド(5)の出力信号から得られるフォーカスエラー(FE)信号及びトラッキングエラー(TE)信号が制御回路(7)からサーボ回路(9)に供給されて、FE信号及びTE信号に基づいて、光学ヘッド(5)に装備されているアクチュエータ(図示省略)に対するフォーカスサーボ及びトラッキングサーボが実行される。又、制御回路(7)からサーボ回路(9)に外部同期信号が供給されて、該信号に基づきスピンドルモータ(2)の回転が制御される。

10 更に、光磁気ディスク(1)に対向して、光磁気ディスク(1)の温度を測定するための温度センサ(8)が設置され、該温度センサ(8)の出力端は制御回路(7)に接続されている。制御回路(7)では、温度センサ(8)から得られる温度データに基づいてレーザパワー制御信号が作成され、作成された信号は前記レーザ駆動回路(6)に供給される。レーザ駆動回路(6)では、該レーザパワー制御信号に応じて、信号再生時及び信号記録時に光学ヘッド(5)から出射されるレーザ光のパワーが後述の如く調整される。

図2は、ディスク記録再生装置の起動時に上記制御回路(7)によって実行される手続きを表わしている。装置本体の電源がオンに設定されると、先ずステップS1にてサーボ回路(9)の各種ゲインを初期値に設定し、ステップS2では、TE信号に基づいてフォーカスのオフセット値の調整を行なう。

次にステップS3にて、TE信号に基づいてトラッキングのオフセット値の調整を行なった後、ステップS4にて、記録パワー及び再生パワーをそれぞれ初期値に設定し、更にステップS5では、光磁気ディスクに記録されているアドレス情報を読み出すために必要なゲイン(アドレスゲイン)、及びFCM(ファインクロックマーク)を読み出すために必要なゲイン(FCMゲイン)を初期値に設定する。

続いてステップS6では、RF信号に基づいてフォーカスのオフセット値の調

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整を行なった後、ステップS7にて再生パワーの調整を行なう。更にステップS8にて、フォーカスのサーボゲイン及びトラッキングのサーボゲインの調整を行なった後、ステップS9では、前記アドレスゲイン及びFCMゲインの調整を行なう。これらステップS6~ステップS9の一連の調整処理は、光磁気ディスクに予め設けられているテストトラックのランド及びグルーブの夫々について実行される。

更にステップS10では、テストトラックのランド及びグループの夫々について記録パワーの調整を行ない、ステップS11では、上述の如く調整したパラメータの現在値のチェックを行なう。最後にステップS12にて、それらのパラメータの現在値を内蔵メモリに格納した後、ステップS13にて現在のディスク温度 T_0 を内蔵メモリに格納して、手続きを終了する。

上記ステップS7の再生パワー調整処理においては、図6に示す如く、先ず再生パワーを初期値 P_0 に設定し、再生パワーを下げることによって、再生パワーをエラーレートが所定の規定値(=20)以下となる下方境界値 $Prmin_1$ まで変化させ、その後、その再生パワーに所定値N(所定ステップ分のパワー)を加算することによって、最適再生パワー P_1 を求める。かかる手順は、従来のディスク記録再生装置において起動時に実行される再生パワー調整処理と同一である。

図3は、上記ステップS7にて実行される再生パワー調整処理の具体的手続きを表わしている。先ずステップS21にて、現在の再生パワーPrとして初期値P。を設定し、ステップS22にて、テストトラックの再生を行なって、そのときのエラーレートEを測定する。次にステップS23では、測定したエラーレートEが規定値E。(=20)を上回っているか否かを判断し、ノーと判断された場合は、ステップS24に移行して再生パワーPrを4ステップ分だけ下げた後、ステップS22に戻って、同じ手続きを繰り返す。

25 その後、エラーレートEが規定値 E_0 を上回ってステップS23にてイエスと判断されると、ステップS25に移行して、再生パワーPrを1ステップ分だけ上げ

た後、ステップS26にて、テストトラックの再生を行なって、そのときのエラーレートE'を測定する。次にステップS27では、測定したエラーレートE'が規定値 E_0 以下であるか否かを判断し、ノーと判断された場合は、ステップS25に戻って、同じ手続きを繰り返す。

5 エラーレートE'が規定値E。以下となってステップS27にてイエスと判断されると、ステップS28に移行して、その時点での再生パワーPrを下方境界値Prminとし、更にステップS29では、下方境界値Prminを内蔵メモリに格納した後、ステップS30にて下方境界再生パワーPrminに4ステップ分のパワーを加算して得られる値を最適再生パワーPrcentとして、手続きを終了する。この結果、最適なレーザパワーで信号の再生及び記録が開始されることになる。

図4は、システム起動後、信号再生及び信号記録のための通常動作において制御回路(7)によって実行される手続きを表わしている。通常動作が開始されると、 先ずステップS31にて、過去のディスク温度T_{01d}として、上述の如く装置本体の起動時に内蔵メモリに格納された温度T₀を設定し、ステップS32では、一定時間だけ時間の経過を待った後、現在のディスク温度T_{now}を測定する。

続いてステップS33では、現在のディスク温度 T_{now} が過去のディスク温度 T_{old} に所定温度 T_{thr} を加算して得られる温度 $(T_{old}+T_{thr})$ 以上であるか否かを判断し、ノーと判断された場合はステップS32に戻って、同じ手続きを繰り返す。ここで、所定温度 T_{thr} は、例えば5 $^{\circ}$ Cに設定される。

20 ディスク温度に前記所定温度T_{thr}以上の変化が生じてステップS33にてイエスと判断されると、ステップS34に移行して、装置本体がディスクの温度変化に応じて各種のパラメータを調整することが可能な状態に設定されているか否かを判断し、ノーと判断された場合はステップS32に戻る一方、イエスと判断された場合はステップS35に移行して、再生パワーの調整を行なった後、ステップS36にて記録パワーの調整を行なう。

更にステップS37にて、RF信号に基づいてフォーカスのオフセット値の調

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整を行なった後、ステップS38では、TE信号に基づいてフォーカスのオフセット値の調整を行なう。最後にステップS39にて、上述の如く調整したパラメータの現在値を内蔵メモリに格納した後、ステップS40にて、過去のディスタ温度Tnuxに設定して、ステップS32に戻る。

上記ステップS35の再生パワー調整処理においては、図7に示す如く、先ず再生パワーを前回の調整処理において得られた下方境界値Prmin₁から下げることによって、再生パワーをエラーレートがその時点で所定の規定値(=20)以下となる下方境界値Prmin₂まで変化させ、その後、その再生パワーに所定値N(所定ステップ分のパワー)を加算することによって、最適再生パワーP₂を求める。

10 図 5 は、上記ステップS 3 5 にて実行される再生パワー調整処理の具体的手続きを表わしている。先ずステップS 4 1 にて、再生パワーPrとして、内蔵メモリに格納されている下方境界値Prminを設定し、ステップS 4 2 にて、テストトラックの再生を行なって、そのときのエラーレートEを測定する。次にステップS 4 3 では、測定したエラーレートEが規定値E。(=20)を上回っているか否かを判断し、ノーと判断された場合は、ステップS 4 4 に移行して再生パワーPrを4ステップ分だけ下げた後、ステップS 4 2 に戻って、同じ手続きを繰り返す。

その後、エラーレートEが規定値 E_0 を上回ってステップS43にてイエスと判断されると、ステップS45に移行して再生パワーPr81ステップ分だけ上げた後、ステップS46にて、テストトラックの再生を行なって、そのときのエラーレートE'を測定する。次にステップS47では、測定したエラーレートE'が規定値 E_0 以下であるか否かを判断し、ノーと判断された場合は、ステップS45に戻って、同じ手続きを繰り返す。

エラーレートE¹が規定値E₀以下となってステップS 4 7にてイエスと判断されると、ステップS 4 8に移行して、その時点での再生パワーPrを下方境界値Prminとし、最後にステップS 4 9にて、該下方境界値Prminを内蔵メモリに格納した後、ステップS 5 0にて、下方境界再生パワーPrminに 4 ステップ分のパワ

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ーを加算して得られる値を最適再生パワーPrcentとして、手続きを終了する。この結果、光磁気ディスクの温度に応じた最適なレーザパワーで信号の再生及び記録が継続されることになる。

本発明に係るディスク記録再生装置の信号再生時及び信号記録時に実行される 再生パワー調整処理においては、図 7に示す如く、前回の調整処理において得られた下方境界値 Prmin $_1$ を基準として新たな下方境界値 Prmin $_2$ が検索される。この様に、新たな下方境界値 Prmin $_2$ の検索の際、その時点で設定されている再生パワー P_1 よりも新たな下方境界値 Prmin $_2$ に近い前回値 Prmin $_1$ が基準とされるので、下方境界値の検索に要する時間が短縮化される。これによって最適再生パワーの算出にかかる時間が短縮され、本来の再生動作及び記録動作に支障をきたす虞はない。

尚、本発明の各部構成は上記実施の形態に限らず、特許請求の範囲に記載の技 術的範囲内で種々の変形が可能である。

例えば、図2のステップS10及び図4のステップS36にて実行される記録 15 パワー調整処理において、再生パワー調整処理と同様の図7に表わされる手順を 採用することが可能である。

又、上記実施の形態においては、エラーレートが規定値以下となる再生パワーを下方境界再生パワーPrminとして検索する構成を採用しているが、エラーレートが規定値以上となる再生パワーを下方境界再生パワーとして検索する構成を採用することも可能である。

請求の範囲

1. ディスクに光学ヘッドからレーザ光を照射して、該ディスクから信号を再生することが可能であって、光学ヘッドに駆動信号を供給して光学ヘッドが出射するレーザ光のパワーを調整することが可能なレーザ駆動回路と、レーザ駆動回路の動作を制御する制御回路とを具えたディスク再生装置において、制御回路は、信号再生時のレーザ光のパワーを最適化する処理を繰り返す再生パワー最適化手段を具え、該再生パワー最適化手段は、

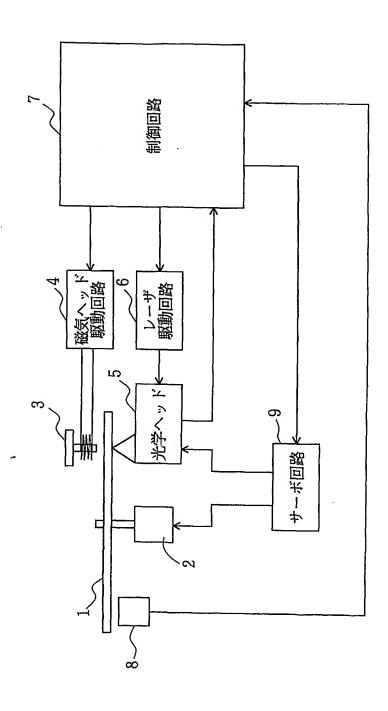
信号再生状態の良否を表わす評価データを検出する評価データ検出手段と、

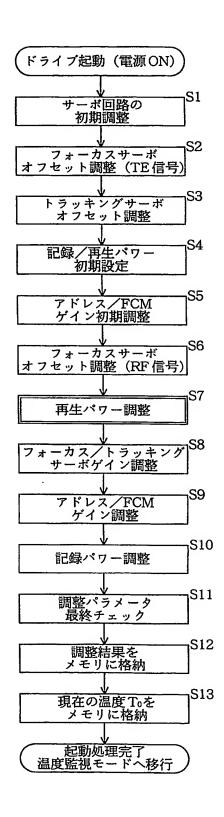
10 評価データが規定値或いはその近傍値となる再生パワーの2つの境界値の内、 一方の境界値を検索する検索手段と、

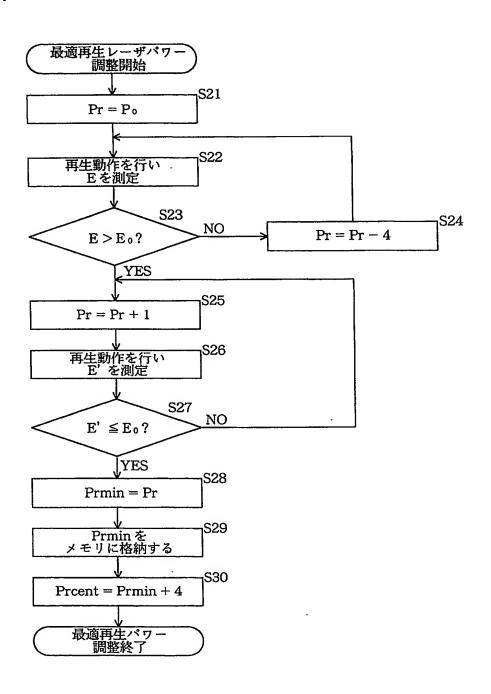
検索された一方の境界値を基準として最適再生パワーを算出する最適再生パワー 一算出手段

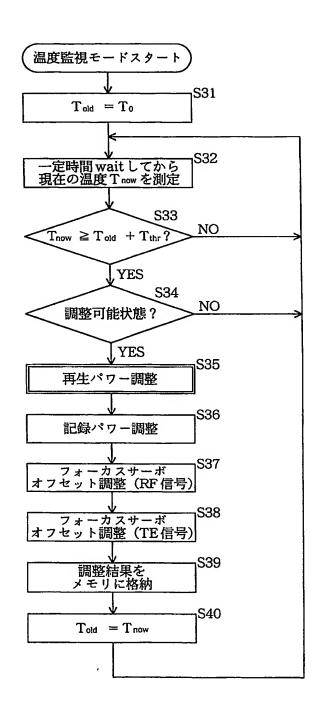
とから構成され、前記検索手段は、前回の最適化処理で得られた境界値を基準と 15 して新たな境界値を検索することを特徴とするディスク再生装置。

- 2. 検索手段は、前記2つの境界値の内、値の小さい方の下方境界値を検索し、 最適再生パワー算出手段は、下方境界値に所定値を加算することによって最適再 生パワーを決定する請求の範囲第1項に記載のディスク再生装置。
- 3. 評価データは、再生信号に含まれるビットエラーの発生頻度である請求の範 20 囲第1項又は第2項に記載のディスク再生装置。
 - 4. ディスクの温度を検出する温度検出手段を具え、再生パワー最適化手段は、 ディスクの温度が所定温度だけ変化する度に再生パワーの最適化を実行する請求 の範囲第1項乃至第3項の何れかに記載のディスク再生装置。









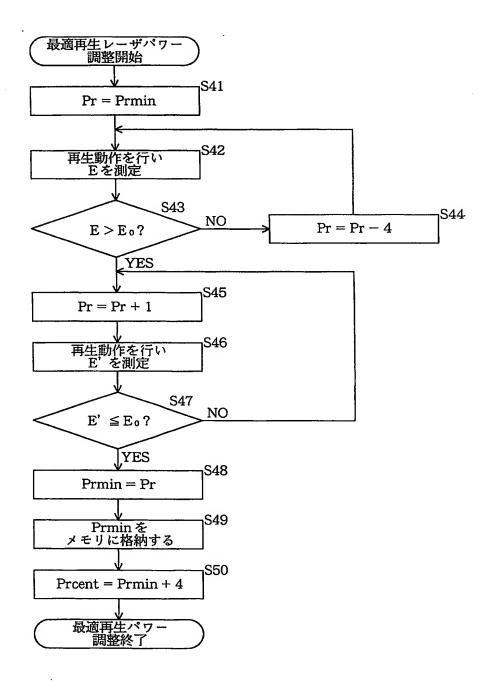
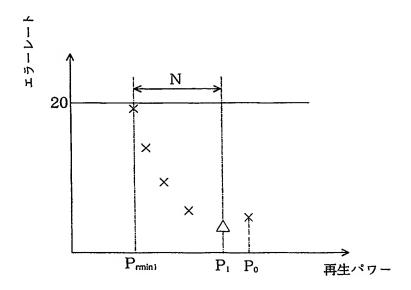


図 6



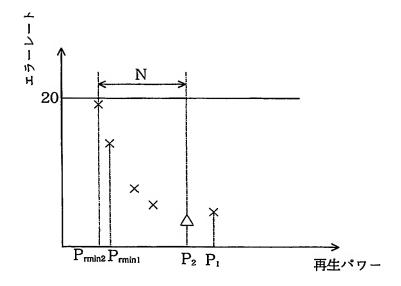
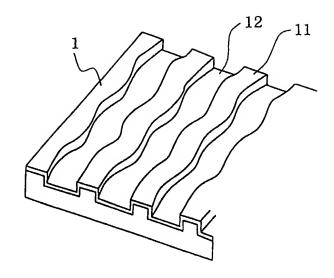
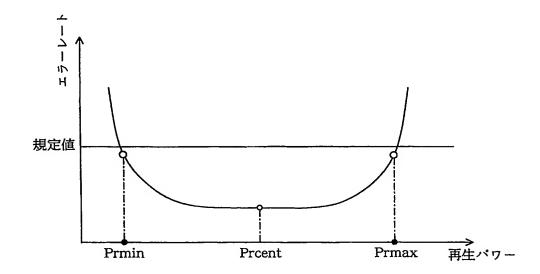
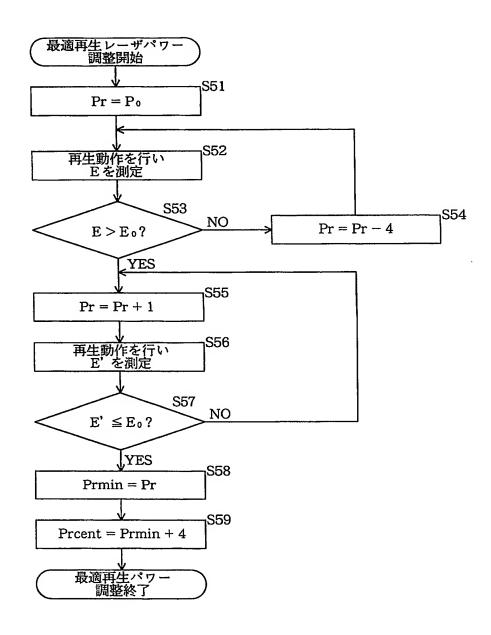


図8







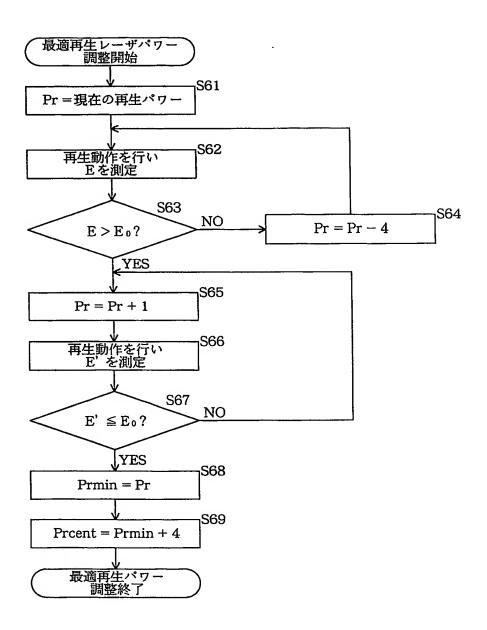
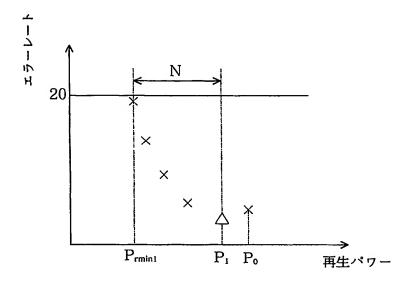
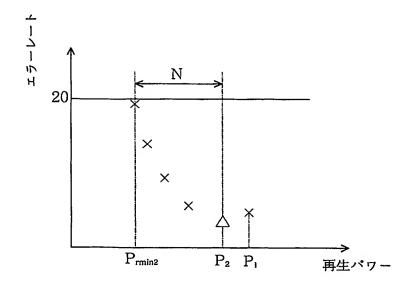


図 12





INTERNATIONAL SEARCH REPORT

International application No.

Japanese Patent Office Facsimile No. Telephone No.		PCT/JI	203/0950/
According to International Patent Classification (IPC) or to both national classification and IPC B. FIELDS SEARCHED Minimum documentation searched (classification system followed by classification symbols)			
According to International Patent Classification (IPC) or to both national classification and IPC B. FIELDS SEARCHED Minimum documentation searched (classification system followed by classification symbols)	Int.Cl ⁷ G11B7/005, 7/125, 11/105		
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Minimum documentation searched (chastification system followed by classification symbols) Int.Cl7 G11B7/00-7/013, 7/12-7/22, 7/30, 11/00-11/105 Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched Jitsuyo Shinan Koho 1994-2003 Kokai Jitsuyo Shinan Koho 1971-2003 Jitsuyo Shinan Toroku Koho 1996-2003 Electronic data base consulted during the international search (name of data base and, where practicable, search terms used) Electronic data base consulted during the international search (name of data base and, where practicable, search terms used) C. DOCUMENTS CONSIDERED TO BE RELEVANT Category* Citation of document, with indication, where appropriate, of the relevant passages Relevant to claim No. JP 8-221760 A (Fujitsu Ltd.), 30 August, 1996 (30.08.96), Full text 6 uS 5617400 A X JP 11-053781 A (Sharp Corp.), 26 February, 1999 (26.02.99), Full text 5 EP 896326 A2 6 US 6392970 B1 Purply the document state of the att which is not considered to be of particular relevance earther document but published on or after the international filing date or or acceptance of the state of the shift of the			
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国際調査報告

国際出願番号 PCT/JP03/09507

	一 国际山脉番号 FCI/JFU:	, 09507	
A. 発明の属する分野の分類(国際特許分類(IPC))			
Int. Cl' G11B7/005, 7/125, 11/105			
B. 調査を行った分野			
調査を行った最小限資料(国際特許分類(IPC))			
Int. Cl ⁷ G11B7/00-7/013, 7/	12-7/22, 7/30, 11/00	-11/105	
最小限資料以外の資料で調査を行った分野に含まれるもの 日本実用新案公報 1922-1996年			
日本公開実用新案公報 1971-2003年 日本登録実用新案公報 1994-2003年			
日本実用新案登録公報 1996-2003年			
国際調査で使用した電子データベース (データベースの名称、調査に使用した用語)			
C. 関連すると認められる文献			
引用文献の カテゴリー* 引用文献名 及び一部の箇所が関連すると	ささは、その関連する箇所の表示	関連する 請求の範囲の番号	
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1999.02.26,全文		1 4	
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